

$^{12}\text{C}(^6\text{Li},\text{p})$ 1986Sm10,2008Cr03

- 1960Sh05:** Experiment was performed with 2-MeV Li ions at Van de Graaff/Saclay. Differential cross sections and angular distributions of the ground and first four excited states of ^{17}O were measured.
- 1962B113:** Absolute differential cross sections are presented for the reactions $^{12}\text{C}(^6\text{Li},\text{p})^{17}\text{O}$ (ground state and first three excited states) at $E=3.4\text{--}4.0$ MeV. Total cross sections are ≈ 1 mb at 4.0 MeV.
- 1963Ba08:** Bombardment of ^{12}C by ^6Li ions at $E=3$ MeV. Relative angular distributions were determined for protons to the 2nd, 3rd, and 4th excited states of ^{17}O . Deduced nuclear properties.
- 1966He05:** The $^6\text{Li}+^{12}\text{C}$ reaction was studied for bombarding energies $E=4.5\text{--}5.5$ MeV. Angular distributions and total cross sections have been obtained at 100-keV intervals using a $dE/dx\text{--}E$ system coupled to a computer. The reaction products for proton groups from the ground and first four excited states of ^{17}O were studied.
- 1967Dz01:** Differential cross-section measurements for $^6\text{Li}+^{12}\text{C}$ reactions were presented in 100-keV steps between 2.4 and 8.5 MeV at 0° and in 200-keV steps between 3.4 and 7.4 MeV at 40° (lab). Outgoing particles cross sections, p_{0-3} , involving ground and first three excited states of ^{17}O were measured.
- 1968Me10:** A positive-ion beam of ^6Li at $E_{\text{lab}}=20$ MeV impinged on a natural carbon target ($130\text{ }\mu\text{g}/\text{cm}^2$) at the Tandem Van de Graaff accelerator, Heidelberg. The reaction products were detected and identified using detector telescopes and $\Delta E\text{--}E$ method. The low-lying states of ^{17}O were not observed and the medium excitation range were not resolved in this experiment. The proton angular distribution could only be obtained for the $^{17}\text{O}^*(8.46\text{ MeV}; (7/2^+))$ excited state.
- 1970Jo09:** An $E(^6\text{Li})=5.6\text{--}14.0$ MeV beam impinged on a self-supporting carbon foils (evaporated from an arc onto Teepol-coated slides) with thickness $10\text{--}52\text{ }\mu\text{g}/\text{cm}^2$ at the University of Iowa HVEC Model CN Van de Graaff accelerator. Cross sections were measured for protons, deuterons, and α particles at $\theta_{\text{lab}}=0^\circ$ and 40° and angular distributions were measured at various energies. Solid-state, ΔE and E detectors were used to detect and identify particles. The absolute error of total cross sections is estimated to be $\pm 15\%$. Energy levels of $^{17}\text{O}^*(0, 0.871, 3.058, 3.846\text{ and }4.551\text{ MeV})$ were observed.
- 1980Ne05:** A ^6Li ion beam at $E=156$ MeV bombarded a $4.5\text{ mg}/\text{cm}^2$ natural ^{12}C target using the Karlsruhe Isochronous Cyclotron. Charged particles were detected by a semiconductor telescope consisting of a ΔE surface-barrier Si detector (0.3 mm) and two germanium detectors (15 mm and 20 mm) with the energy resolution was ≈ 500 keV (FWHM). The solid angle covered was 4×10^{-5} sr and the angular resolution was $\Delta\theta\approx 0.2^\circ$. The particles were identified by an off-line-procedure on the basis of the Goulding-method. The break-up cross sections were measured.
- 1982Ta23:** $^{12}\text{C}(^6\text{Li},\text{p})$, $E=36,32,28$ MeV; measured yield vs particle energy, $\sigma(\theta)$, fusion σ , breakup σ vs E ; deduced reaction mechanism. Optical, simple breakup model analyses.
- 1986Sm10:** ^{17}O energy levels were populated by bombardment of an $E=28$ MeV ion beam of ^6Li , from FN tandem accelerator at the University of Pennsylvania, with a self-supporting carbon foils ($50\text{ }\mu\text{g}/\text{cm}^2$; $>99.5\%$ ^{12}C). The outgoing protons were momentum analyzed in a multiangle spectrograph and detected in Ilford L4 nuclear emulsions in the focal plane. A proton spectrum was measured at $\theta=15^\circ$ with resolution FWHM ≈ 45 keV. Most of the known ^{17}O levels were populated. See also (1985SmZZ).
- 2008Cr03:** XUNDL dataset compiled by McMaster, 2008.
- $E=32$ MeV beam provided by FN tandem accelerator at Florida State. Detected charged particles using two $\Delta E\text{--}E$ Si telescopes. FWHM=110 keV. Measured protons, absolute cross sections, angular distributions. DWBA analysis.

 ^{17}O Levels

| $E(\text{level})^{\dagger\ddagger}$ | $J\pi^\#$ | $L^\#$ | $C^2S^\#\&$ | Comments |
|-------------------------------------|------------------|--------|-------------|--|
| 0 | | | | |
| 869 10 | | | | |
| 3056 8 | | | | |
| 3844 7 | 5/2 ⁻ | | | E(level): See also 3843 keV (2008Cr03: Fig. 1). |
| 4555 8 | 3/2 ⁻ | | | E(level): See also 4554 keV (2008Cr03: Fig. 1). |
| 5079 15 | | | | |
| 5217 8 | 9/2 ⁻ | | | E(level): See also 5216 keV (2008Cr03: Fig. 1). |
| 5380 9 | | | | |
| 5719 ^a 12 | | | | E(level): See also doublet 5700 keV (2008Cr03: Fig. 1). |
| 5877 14 | | | | E(level): See also doublet 5900keV (2008Cr03: Fig. 1). |
| 6861 2 | 5/2 ⁺ | 3 | 0.30 | E(level): See also 6862 keV 13 (2008Cr03). Configuration= $^{12}\text{C}_{\text{g.s.}}+1\text{p}_{1/2}^2, 1\text{d}_{5/2}^3\text{--}(3\text{p--}2\text{h})$ (2008Cr03). |
| 6974 5 | | | | |
| 7175 14 | | | | |
| 7388 ^a 14 | | | | E(level): See also doublet 7380 keV (2008Cr03: Fig. 1). |

Continued on next page (footnotes at end of table)

$^{12}\text{C}(^6\text{Li},\text{p})$ **1986Sm10,2008Cr03 (continued)** ^{17}O Levels (continued)

| E(level) ^{†‡} | J ^π # | Γ [@] | L# | C ² S ^{#&} | Comments |
|------------------------|---------------------|----------------|----|------------------------------------|--|
| 7576 13 | 7/2 ⁺ | | 5 | 0.25 | E(level): from (2008Cr03). E(level): See also doublet 7580 keV 16 (1986Sm10). Configuration= $^{12}\text{C}_{\text{g.s.}} + 1\text{p}_{1/2}^2, 1\text{d}_{5/2}^3$ -(3p-2h) (2008Cr03). E(level): See also doublet 7720 keV (2008Cr03: Fig. 1). |
| 7690 15 | | | | | |
| 7773 16 | | | | | |
| 8210 25 | | | | | |
| 8.40×10 ³ | | | | | |
| 8473 9 | 9/2 ⁺ | | 3 | 0.81 | E(level): weighted average of 8476 keV 12 (1986Sm10) and 8470 keV 13 (2008Cr03). E(level): See also 8.46 MeV (1968Me10) which is suspected to be the 7/2 ⁺ member of a k=1/2 ⁺ rotational band starting at the 6.37 MeV 1/2 ⁺ level in ^{17}O . Configuration= $^{12}\text{C}_{\text{g.s.}} + 1\text{p}_{1/2}^2, 1\text{d}_{5/2}^3$ -(3p-2h) (2008Cr03). |
| 8702 12 | | | | | |
| 8905 8 | | | | | E(level): See also triplet 8900 keV (2008Cr03: Fig. 1). |
| 8966 15 | | | | | |
| 9181 ^a 9 | | | | | E(level): See also quadruplet 9190 keV (2008Cr03: Fig. 1). |
| 9487 8 | | | | | |
| 9719 15 | 7/2 ⁺ | | | | E(level): See also 9712 keV (2008Cr03: Fig. 1). |
| 9866 ^a 11 | | | | | E(level): See also doublet 9870 keV (2008Cr03: Fig. 1). J ^π : (1983Cu02) suggests a 9/2 ⁺ state at 9.87 MeV. |
| 10426 8 | | | | | |
| 10549 9 | | | | | |
| 10694 8 | | <40 keV | | | E(level): See also 10690 keV 26 (2008Cr03). |
| 10915 | (5/2 ⁺) | | | | E(level): average of 10920 keV (1986Sm10) and 10910 keV (2008Cr03: Fig. 1). |
| 11.03×10 ³ | | | | | |
| 11815 13 | 7/2 ⁺ | | 5 | 0.23 | E(level): from (2008Cr03). E(level): See also 11815 keV 20 (1986Sm10). Configuration= $^{12}\text{C}_{\text{g.s.}} + 1\text{p}_{1/2}^0, 1\text{d}_{5/2}^5$ -(5p-4h) (2008Cr03). |
| 12013 16 | 9/2 ⁺ | <50 keV | 3 | 0.28 | E(level): weighted average of 12020 keV 20 (1986Sm10) and 12000 keV 26 (2008Cr03). Configuration= $^{12}\text{C}_{\text{g.s.}} + 1\text{p}_{1/2}^0, 1\text{d}_{5/2}^5$ -(5p-4h) (2008Cr03). |
| 12239 16 | 7/2 ⁻ | | 2 | 1.32 | E(level): weighted average of 12250 keV 20 (1986Sm10) and 12220 keV 26 (2008Cr03). |
| 12428 13 | 9/2 ⁺ | <50 keV | 5 | 0.20 | Configuration= $^{12}\text{C}_{\text{g.s.}} + 1\text{p}_{1/2}^3, 1\text{d}_{5/2}^2$ -(2p-1h) (2008Cr03). E(level): weighted average of 12430 keV 15 (1986Sm10) and 12420 keV 26 (2008Cr03). |
| 12760 26 | | <70 keV | | | Configuration= $^{12}\text{C}_{\text{g.s.}} + 1\text{p}_{1/2}^0, 1\text{d}_{5/2}^5$ -(5p-4h) (2008Cr03). E(level): from (2008Cr03). Γ: Estimated based on the FWHM of the peak in the $^{12}\text{C}(^7\text{Li},\text{d})$ reaction (2008Cr03). |
| 13070 26 | | | | | E(level): from (2008Cr03). |
| 13580 26 | | | | | E(level): from (2008Cr03). |
| 14880 26 | | | | | E(level): from (2008Cr03: quadruplet). |
| 15620 26 | | | | | E(level): from (2008Cr03). |

[†] From (1986Sm10) except where noted.[‡] See also (1960Sh05,1962B113,1963Ba08,1966He05,1967Dz01,1970Jo09).

From (2008Cr03). Some concern is raised over the small number of nodes used in the DWBA analysis for some cases (priv. comm. J. Millener).

@ From (1986Sm10) except where noted. Width measurement limited by detector resolution of the $^{12}\text{C}(^6\text{Li},\text{p})$ measurement

$^{12}\text{C}(^6\text{Li,p})$ [1986Sm10,2008Cr03](#) (continued)

^{17}O Levels (continued)

[\(2008Cr03\)](#).

[&] Assuming a ^5He cluster and configurations as listed.

^a Doublet.